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ABSTRACT

A study was conducted to determine how the information highway affects today's children and to develop a set of national children's goals and an action plan for achieving them. The study's methodology included a review of relevant child development and telecommunications literature, identification of model programs, analysis of experiences with earlier technologies, and interviews with educational experts. Key findings included the following: (1) emerging information technologies will affect children's quality of life; (2) most American children do not have the skills they will need for the job market; (3) affluent parents are supplementing the information technology education their children receive at school; (4) America's school system represents the best way to teach every child information and technological skills; (5) the home is where children will most likely experience the widest range of new media; (6) new media bring new threats to children; (7) some of the most innovative uses of new information technologies are taking place in local communities; (8) the commercial marketplace cannot be counted on to take the best interests of children into account; and (9) low-income, disabled, and rural children are at particular risk of being left out. Based on these findings, goals related to information access, at-risk groups, educational needs, high-quality content, protection against abuses, industry responsibility, parent and citizen action, and youth involvement were established. To meet these goals, a seven-step action plan was developed, offering a blueprint for government and industry leaders, leaders in public, private and philanthropic sectors, parents, young people, and children's advocates. Contains 30 references. (AC)

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America's Children & The Information Superhighway

A Briefing Book and National Action Agenda

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THE CHILDREN'S PARTNERSHIP

NEW IDEAS FOR AMERICA'S CHILDREN

The Children's Partnership is a national nonprofit, nonpartisan organization whose mission is to place the needs of America's 67 million children at the forefront of emerging national policy debates, and to enlist the public in a timely way to the benefit of children. The Partnership also identifies new trends and crafts new strategies to address the needs of children, and in this way functions as a research and development (R&D) arm for the children's movement.

The Partnership undertakes research and policy analysis, publishes reports and materials, organizes advocacy campaigns, and forges new alliances among parents, policymakers and private sector entities to achieve gains for children.

The Children's Partnership was founded by Wendy Lazarus and Laurie Lipper in November 1993. It benefits from the expertise of a distinguished board of national advisors who are leaders in the fields of children's policy, business, marketing, public opinion research and philanthropy.
(See inside back cover.)

The Children's Partnership is a project of the Tides Foundation. Its work is supported by private foundations, corporations, the entertainment community, interested individuals and others with whom it partners on projects. The Children's Partnership has an office in Los Angeles and will open a Washington, DC office in November 1994.

Current projects include:

Children and the Information Superhighway: A two-year project to define how the information superhighway and related technologies can best serve children. It uses fact-finding, policy analysis and parent education to influence the development of these new technologies and to build momentum for necessary action.

Parents and Health Care Reform: A project designed to educate and involve parents in the debate over health care reform. This project will also guide parents in selecting health plans and in advocating for their children within a new health care system.

The Children's Information Service: A national information service for the media, which will provide timely bulletins about children's issues and stories, as well as frame news and events from the perspective of children.

The American Public and Our Nation's Children: An ongoing public opinion research and publishing program which probes the connection between public values and national issues affecting children.

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America's Children & The Information Superhighway

A Briefing Book & National Action Agenda

A Publication of The Children's Partnership
September 1994
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The Children's Partnership is a project of the Tides Foundation.

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The Children's Partnership

CHILDREN AND THE INFORMATION SUPERHIGHWAY: AT A GLANCE

Number of children in U.S.: 67.4 million[1]

Number of K-12 students: 47 million[2]

Number of babies born in 1992: 4 million[3]

Annual expenditures on entertainment and recreation: $340 billion[4]

Annual expenditures on elementary and secondary education (public and private): $270 billion[5]

Average age of Internet user in 1994: 26[6]

Average age of Internet user in 2000: 15[7]

U.S. households with a TV: 98.3%[8]

Households with basic telephone service: 94.9%[9]

Households with a VCR: 85%[10]

Households with cable TV: 63%[11]

Households with a personal computer: 35%[12]

Households with incomes over $100,000 with a personal computer: 65%[13]

Households with incomes under $20,000 with a personal computer: 11%[14]

Percentage of schools with at least one computer: 99%[15]

Percentage of school computers that are considered "obsolete": 80%[16]

Amount of homework U.S. teenagers average: 4.5 hours per week[17]

Amount of homework Japanese and European teenagers average: 4.5 hours per day[18]

Hours U.S. children who have home video games spend playing them: 1.5 per day[19]

Amount of TV watched by children ages 2-11: 23 hours, 41 minutes per week[20]

Amount of TV watched by teens: 23 hours, 13 minutes per week[21]

Increased probability of obesity for every hour per day of TV viewed: 2%[22]

Amount of own money children 12 and under spend annually: $8.6 billion[23]

Amount of own money children 13-18 spend annually: $57 billion[24]

Parental spending influenced by children annually: $132 billion[25]

Advertising expenditures on broadcast TV targeted at children: $800 million[26]

Age at which children start asking for brand-name items: 2[27]

Home video game revenues 1993: $8.5 billion[28]

Retail sales of all home educational programs 1993: $147 million[29]

Retail sales of Mortal Kombat 1993: $275 million[30]

Worldwide telecommunications revenues 1993: $700 billion[31]

Worldwide telecommunications revenues 2003: $3 trillion (an increase of 428%)[32]

Communications and Technology Timeline: c. 3000 BC: Alphabet developed • 45 BC: First "newspaper" created by Julius Caesar • 1454: Movable type invented by Gutenberg • 1621:

1

INTRODUCTION

CHILDREN AND THE INFORMATION SUPERHIGHWAY

As the 20th century gives way to the 21st, the Industrial Age is giving way to the Information Age. This new era has profound implications for our children's lives and for their future.

> Americans marveling at Thomas Edison's incandescent light and Alexander Graham Bell's telephone thought they were living in revolutionary times and they were. But by comparison we today are strapped to a rocket whose velocity and range we can only faintly comprehend. Computer technology is carrying us into an era when the production and distribution of knowledge and information will be vastly more important than the production and distribution of things. We have not begun to grapple with the implications of this for society, and especially for the way we earn a living, educate our children, and manage our economies.
>
> —*Mortimer Zuckerman, Editor-in-Chief, U.S. News & World Report*[1]

The telephone, television and computer are merging into a multimedia communications system commonly called the "information superhighway." Interactive technology will give us access to information from thousands of databases, and let us shop from home, participate in discussion groups hundreds of miles away, and send instant messages anywhere on earth.

Telecommunications, technology and software companies, recognizing the enormous commercial potential, are realigning to meet new challenges. They are also negotiating with policymakers at the local, state and federal levels to determine who will stand to profit most from the information superhighway.

Every one of the 67 million children in America today, along with the approximately 4 million born each year, will be affected by the information revolution. But the needs and interests of America's children have not yet been comprehensively addressed.

THE NEW TECHNOLOGIES AND NATIONAL PRIORITIES

The way a society uses technology reflects social priorities and values. The ultimate shape of the new communications system will represent what Americans believe is most important, useful, entertaining and fair. The federal government has already acknowledged the importance of the information superhighway to all Americans, and the need to ensure that every citizen has access to the information resources needed for full participation in American life.

> Because information means empowerment, the government has a duty to ensure that all Americans have access to the resources of the Information Age.... As a matter of fundamental fairness, this nation cannot accept a division of our people among telecommunications or information "haves" and "have-nots."
>
> —*Information Infrastructure Task Force*[2]

At the same time, the private sector will be the primary builder of the information infrastructure, bringing competition and needed capital to the effort.

There is by definition an inherent tension between public interest goals, such as universal reach, and the private sector bottom-line goal of realizing the maximum profit. Without strong public intervention, millions of Americans will be left by the roadside of the superhighway.

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Americans already recognize that these new resources should be utilized for purposes besides commerce and entertainment.

> 77% of likely voters in a recent survey agree that government should provide grants to help communities and nonprofit groups make new technologies available in schools, libraries and hospitals.[3]

As this report demonstrates, the need for strong public action is particularly crucial when it comes to the needs of children. Since children do not vote — or hire lobbyists — their interests depend on the stewardship of policymakers, parents, teachers and advocates.

WHY DOES THE INFORMATION SUPERHIGHWAY MATTER TO CHILDREN?

- Increasing numbers of jobs require information and technology skills that our children are not being taught.
- The market, alone, cannot be depended upon to supply the educational, age-appropriate and socially-appropriate programming that all children need. Simply providing a new conduit for commercialism wastes the potential of the information superhighway to benefit children.
- Some important uses that benefit children may not be commercially attractive, yet are important to promote.
- Protections for children that exist in traditional media — such as laws against cigarette advertising on TV — have not yet been tested in the new media.
- Without vigorous advocacy, the needs of children will not be met.

CHILDHOOD IN A TECHNOLOGICAL WORLD

- Imagine if school children in a low-income neighborhood with precious few library books could use a modem-equipped computer and access all of the resources in the Library of Congress.
- Imagine if students were able to use interactive technology to talk directly to experts or other children around the world; be taught by the best teachers from remote locations; and insert video footage of a space shuttle take-off into their multimedia report on space travel.
- Imagine if a parent who could not leave work for a teacher conference could meet with the teacher by teleconference from work.

In this report, we have focused on the many practical ways that information technologies are affecting or will affect our children. However, as has always been the case, what today's children need most are dedicated and loving families, and safe and strong communities and support systems, including skillful teachers, to give them the right start in life. New technologies can never be a substitute for these essentials.

Nor is technology alone the solution for the many crises young people in this country face: neighborhoods are more dangerous, family structures are changing, workplaces and education systems are being transformed, and more children live in poverty than at any time since 1965.[4] However, if used properly, new technologies can offer new tools which will work with strong public policies to the benefit of children.

Some Important Terms

The term "information superhighway" is used in this report, as in the popular press, to refer to two different things:

1. The developing communications infrastructure. The nationwide network of telephone wire and fiber-optic and coaxial cable over which information moves; and
2. More informally, the delivery of text, video and other information over that network, using computers and modems, cable television, telephones and other delivery systems.

We have used the term "new technologies" to refer to the information superhighway in both senses: as an infrastructure, and as a set of delivery systems that move information from place to place and from person to person.

The terms "new media," "interactive media" and "multimedia" refer specifically to the technologies that enable people to locate, view, store and use information in new ways.

libraries • 1753: First attempts at sending messages by electricity • 1775 (approx.): 65 post offices—1 per 40,000 people • 1792: Post Office Act calls for the expansion of the postal

ABOUT THIS REPORT

This report is divided into two sections: first, a Briefing Book which describes how the information superhighway affects today's children in the future job market, at school and in their homes and communities; second, a set of National Children's Goals and an Action Plan for achieving them.

The report is designed to move the debate about the information superhighway beyond technical and financial questions, to what ultimately will matter most: the impact upon America's children, families and communities. It attempts to strike a balance, describing both the potential benefits and the threats of the new technologies in a way that can help Americans decide which of the potential uses they want for their children. At times we indicate that some technologies are far in the future for most Americans — even though a small number may be currently using them.

Many of the terms used in this report are new and sometimes difficult to distinguish. For that reason we have offered a few key terms and definitions here, and provide a fuller glossary in the back. And, for the purposes of this report, "children" refers to young people up through age 18.

Finally, we are seasoned child advocates and parents, not specialists in technology or telecommunications. We have benefited from the guidance and wisdom of many such experts, although we alone are responsible for the material and conclusions included in the report.

REPORT METHODOLOGY

The findings and recommendations in this report are based on nine months of research, analysis and interviews. We reviewed relevant child development literature, searched out model programs, studied lessons from the history of earlier technologies, and surveyed numerous journals dealing with telecommunications and children's issues. In addition, we interviewed experts in education, child development and the telecommunications industry, representatives of policy institutes, and others knowledgeable about children and interactive media. National project advisors helped design the methodology and action plan, but the findings are our own.

CONCLUSION

Our decision to tackle this subject, which some may initially see as being far afield for children's advocates, goes to the heart of the work of The Children's Partnership, whose mission is to focus on emerging issues affecting children.

We believe that in an information age, access to or isolation from information resources will have a major influence on which children have the opportunities to be successful. We also believe that the challenges surrounding information technologies usher in a new set of children's issues that will become front and center for children's advocates over the next decade.

While it is still too early to know the precise shape of the emerging communications system and what each child will need, we believe that the principles to guide its development can and should be established now. All too often, public advocacy begins after things have gone wrong — child labor abuses, low-achieving schools, questionable television programming, or lack of proper health care. What makes this moment so important is that Americans have the ability to act now, while it is still relatively early, to try to build the information superhighway in the best possible way, and to prevent problems before they arise. The Children's Partnership will continue to educate the public about children's vital interests in these fast-moving developments, and looks forward to helping develop a national strategy and building strong leadership on this important emerging issue.

Wendy Lazarus and Laurie Lipper
Directors
September 1994

system without regard to cost • 1820: 4,500 post offices • 1824: First photograph taken • 1840: Telegraph patented by Samuel Morse; 13,500 post offices • 1840-1850: Cities and states

EXECUTIVE SUMMARY

AMERICA'S CHILDREN & THE INFORMATION SUPERHIGHWAY

This report summarizes the findings of a nine-month examination of how new information technologies affect children's lives. Carried out in conjunction with leading experts in education, telecommunications, child development, marketing, technology and human services, the report defines the stake children have in the developing technologies. It is written for public policymakers, leaders in the communications and entertainment fields, and for parents, teachers and others who take care of children. It is intended to:

- Provide a comprehensive overview of how interactive multimedia and telecommunications technologies affect children's lives;
- Set out goals and an action plan to further the interests of children;
- Spark action on behalf of children in the public and private sectors.

BRIEFING BOOK

This section is a survey of how new technologies affect children in four areas: in the school, home, local communities and the future job market.

Key Findings

1. Emerging information technologies will affect the quality of life of America's children, and therefore every child should have access to them.

Leaders in education, telecommunications, government and commerce underscore that the changes in information technology will alter the way Americans learn, work, play and communicate. This, in turn, will have a substantial impact on America's 67 million children.

2. Most American children do not have the skills they will increasingly need for the job market they will face.

A growing number of American jobs require information and technological skills. The mismatch between available jobs and worker skills has serious implications for employers and workers.

- 47% percent of workers used computers on the job in 1993, up from 25% in 1984.
- More than half of new jobs require using some form of information and technological literacy.
- It is estimated that the majority of new jobs in the year 2000 (60%) will require skills possessed by a small fraction of young people entering the labor market (22%).
- Lack of information literacy costs business an estimated $25 to $30 billion annually in poor product quality, low productivity and accidents.
- In the early 1990s, workers with computer skills earned 10-15% more than workers without such skills.

3. Affluent parents are supplementing the information technology education their children receive at school.

Since most American families cannot afford to do this, there is a growing gap between information "haves" and "have-nots."

- In early 1994, approximately 11 million homes were "on-line."
- 39% of all households with children have a computer; but whereas 48% of households with children whose family income is $50,000 or more have a child using a personal computer, only 7% of households with family income under $20,000 do.

begin to open public libraries • 1842 *Illustrated London News* founded, the first magazine to use photographs • 1843 Congress approves $30,000 to build a telegraph line between

- During 1992 and 1993 sales of home learning software increased over 40% each year; sales are projected to rise to $1 billion by the year 2000.

4. America's school system represents the best way to teach every child information and technological skills.

- 47 million K-12 children in the U.S. are in school, and could acquire information literacy if it were effectively integrated into instruction in the schools.

For many schools, however, there are significant barriers.

- In 1992, fewer than one classroom in seven was equipped with a modem and phone line to connect a computer with the Internet or any other on-line system.
- According to a 1993 study, 80% of all school computers were considered "obsolete."
- California ranks 49th in computer-to-student ratio — a particularly striking fact considering one in eight children in the U.S. lives in California, and it is the center of much of the new technology development.

5. The home is where children will most likely experience the widest range of new media. High-quality content cannot be taken for granted.

As more children grow up with less adult supervision for large parts of the day, care must be taken to ensure that high-quality content is widely available. Excessive commercialism as well as lack of appropriate programming present significant concerns.

- Nearly half of American adolescents have no structured, supervised after-school activity, leaving them without guidance in viewing or using the new media.
- American children spend an average of 10 to 12 fewer hours a week with their parents than they did in 1960.
- By the time youngsters graduate from high school they will have spent more time in front of the television (nearly 20,000 hours) than in school (approximately 16,000 hours).
- Marketing of licensed toys and other products drives television programming today, with product-related shows accounting for the vast majority of new production.

6. New media bring new threats to children.

- Current protections, such as the prohibition against cigarette and excessive advertising, may not carry over into new media.
- In early 1994, Massachusetts police charged a man with raping teens and preteens after enticing them through a computer bulletin board.

7. Some of the most innovative uses of new information technologies are taking place in local communities across the country.

While most of these uses are still at the experimentation stage, they suggest promising new ways to address persistent problems children face. They include:

- Creating new forms of after-school centers incorporating interactive technology training and entertainment.
- Extending health care to children in rural areas via "telemedicine."

8. Left to itself, the commercial marketplace, where much of the superhighway will be developed, can not be counted on to take the best interests of children into account.

The history of consumer and media advocacy demonstrates that vigorous public pressure and persistent advocacy are needed to achieve significant gains for children.

The passage of the 1990 Children's Television Act, which requires television stations to serve the educational and informational needs of children as a condition of license renewal, was the result of vigorous advocacy.

9. Several categories of children are at particular risk of being left out.

Low-income, disabled and rural children are in danger of being left off the highway. In addition, girls and children from diverse racial, ethnic and linguistic backgrounds are often marginalized by mass-marketed software and programming.

- A recent analysis of four Baby Bells' plans to bring video dialtone service to eight cities revealed a pattern of alleged "redlining," or bypassing low-income and minority communities.
- 69% percent of home users of computer on-line services are male; and 85% of interactive computer game users are boys.

10. Despite the fact that children have a vital interest in the development of the information superhighway, there is no comprehensive plan of action on their behalf.

The following section maps out what actions should be taken in order to make the new information technologies responsive to America's children.

NATIONAL GOALS AND ACTION PLAN

National Goals for Children and New Technologies

The following goals for children should provide a common set of principles:

- Universal Reach of Information Technologies to All Children
- Special Attention to Low Income and Other At Risk Children
- Education to Prepare for Jobs and Life in the 21st Century
- High-Quality Content for Children
- Protections Against New Forms of Abuse through Technologies
- Industry Responsibility for Children's Needs
- Parent and Citizen Action
- Youth Involvement

A Seven Step Action Plan

This seven-step Action Plan, designed in conjunction with leaders in new media and children's issues, provides a blueprint for achieving the National Children's Goals.

1. Congress and related federal agencies should develop strategies to provide affordable access for everyone to the needed information resources, and should provide incentives for the development of educational materials.
2. Industry leaders should create a Corporate Leadership Council for Children and New Technologies to encourage private sector initiative and action.
3. Leaders in the public, private and philanthropic sectors should convene a National Summit on Children and New Technologies to put these important issues before the American public and begin to build momentum behind them.
4. In conjunction with the National Summit, these leaders should establish a Blue Ribbon Work Group for Children and New Technologies, charged with crafting a national strategy to ensure that all children in the United States benefit from the information revolution.
5. The nonprofit community should set up an on-line "Consumer Information Service" devoted to the technology-related needs and questions of children and parents.
6. Parents and young people should exercise their influence as citizens and consumers to shape the uses of interactive media.
7. Children's advocates should keep issues relating to children and technology at the top of the public agenda and link them to their ongoing work for children.

CONCLUSION

There is an historic and short-lived opportunity to shape the development of the information superhighway to best benefit children. Over the next few years, major decisions will be made about who will benefit in the Information Age. The findings in this report show that enough is known now about what children need for advocates to represent their interests vigorously.

library for every 600 free Americans. One library book for every two people. 254 newspapers, total circulation 758,000 • 1858: First transatlantic cable—the cable fails a few weeks later •

III

CHILDREN AND NEW TECHNOLOGIES: SKILLS FOR THE FUTURE

> As increasingly capable machines join Americans at the workplace — join them as both co-workers and competitors — the payoff to education and training has soared, and the penalty for lacking skills has stiffened... while the information highway promises to speed some people to desirable destinations, it may leave others stranded in the technological version of inner-city ghettos.
> —*Robert Reich, Secretary of Labor*[1]

INTRODUCTION

New information technologies are rapidly transforming the way America operates and what our children need to learn. Information and technology literacy will be as much a part of 21st century life as knowing how to use a telephone is today.

Changing Workplace

> ...when a corporation adopts electronic mail and starts sending around expense reports and orders...electronically, that's the information highway. When you use your [personal computer] to do home banking, that's the information highway. When you're logged onto an on-line service, plugging into a bulletin board, that's the information highway.
> —*Bill Gates, CEO, Microsoft Corp.*[2]

Already, supermarket workers use laser scanners and computerized cash registers. Delivery people and service representatives at banks and telephone marketing operations use digital tracking systems. Physicians, social workers and other child-serving professionals increasingly make use of computerized records and the digital transfer of information.

In the same way that the fax machine became ubiquitous in the 1990's, computer-mediated communications and computerized recordkeeping will become virtually universal over the next ten years. As businesses lean more heavily on telecommunications and electronic technology, American workers must increasingly learn the ways of electronic communications just to carry out their day-to-day responsibilities.

- Experts agree that more than half of new jobs require some form of technology literacy.[3]
- Today's high school graduate can expect to change jobs six to seven times in the course of a lifetime.[4]
- Investments in information technology hardware comprise more than half of business spending on equipment. In addition, information technology equipment and related services together represent the largest export from the U.S., currently twice as great as the previous leader, aircraft.[5]

A Nation Not Ready

Many Americans are not ready to deal with the changes brought about by a global economy and an increasing demand for technologically-skilled workers. In fact, 90 million adults — about 48% of the adult population — do not possess even basic literacy skills.[6]

We have now, and for the better part of the next generation will continue to have, a workforce that is not sufficiently equipped for highly-skilled work. For example, according to a recent study, 60% of new jobs in the year 2000 will require skills possessed by only 22% of new workers.[7]

The lack of information literacy costs businesses an estimated $25 to $30 billion annually in poor product quality, low productivity and absenteeism. The expense of training and retraining adds significantly more cost.[8]

A New Literacy

Manufacturing and manual labor once provided well-paying jobs for millions of Americans who had little education. These jobs have been disappearing, leaving many family members unemployed or with declining incomes. The better-paying jobs today increasingly require both basic literacy — the ability to read, write and calculate at a relatively advanced level — and information technology skills.

- In 1984, 25% of workers used computers on the job; in 1993 47% did.[9]

1861 Railroads use photographs as employee badges • 1867 Typewriter invented • 1875 79 cities in U.S. and Canada have municipal telegraph systems for emergency service • 1876

- 2/3 of college graduates use computers at work, compared to fewer than 1/10 of high school dropouts.[10]
- In the early 1990s, workers with computer skills earned 10%-15% more than workers without such skills.[11]
- The economic gap between college graduates and non-graduates has grown in the last 15 years: a college graduate earned 49% more than a high-school graduate in 1979; in 1992, a college graduate earned 83% more.[12]

If America is to meet the challenges of an increasingly competitive global economy, the nation needs a workforce ready to compete. Not only are strong basic skills like reading, writing, calculating and critical thinking necessary, but new "information skills" to help workers adapt to changing technologies and workplaces are essential.

SPECIAL CONCERN

Poor Children at Risk

Since the Communications Act of 1934, it has been our national policy that interstate and foreign commerce in communications (by wire or radio) be made "available, so far as possible, *to all people of the United States*, with adequate facilities at reasonable charges."[13] (emphasis added)

However, low-income and rural people have often lagged behind the rest of the country in terms of availability of necessary communications technology, including telephones. Because so many American children face poverty, it is particularly urgent to be sure they are not left behind now.

- In 1992, more American children lived in poverty than in any year since 1965.[14]
- One in four preschool age children lives in poverty.[15]
- The child poverty rate in the United States is now twice as high as that in any other industrialized country.[16]

There are early troubling signs that poor children are at risk of being left out of the information revolution:

- While 65% of households in America with incomes over $100,000 now have a personal computer,[17] only 11% of households with incomes below $20,000 have them.[18]
- A 1994 study found that only 7% of households with incomes below $20,000 had a child using a personal computer.[19]

Poor children are missing out, in part, because of the high cost of new technology, but also because more deliberate market forces are at work: A recent analysis of four Baby Bells' plans to bring video dialtone service (which would allow entertainment programming and information to be delivered over a fiber-optic network) to eight cities revealed a pattern of alleged "redlining" — in other words, bypassing low-income and minority communities.[20] Although these findings come at an early stage in building the highway, they suggest a very troubling pattern that must be monitored closely.

LESSONS FROM HISTORY

> Private telecommunications carriers respond to marketplace forces, and therefore are most likely to exclude those members of the public and institutions with the fewest financial resources: low income people, minorities, individuals with disabilities, the elderly, and noncommercial organizations such as schools, libraries, public broadcasters, and nonprofit community and civic organizations.
> *—Senator Daniel Inouye*[21]

The history of achieving universal telephone service shows the tension between this important public policy goal and the economic realities involved in accomplishing it. Many rural areas of America went without phone service for decades because there were not enough households to make service profitable. It was not until 1945 that Congress tried

linking rural phone service with the Rural Electrification Administration which had brought electricity to the farms in the 1930s. And it was not until Congress passed legislation in 1949 that significant progress was made in providing and subsidizing rural phone service.[22]

Even in 1994, only 94.9% of the nation's households have phones — in contrast to the 98.3% that have televisions. In Mississippi and New Mexico, the phoneless rate is 12%. Of the 5 million American households still without phones, 20% are Native American, 15% are African-American, and 15% are Hispanic households.[23] This history underscores the special steps that will need to be taken to ensure that every American benefits from the information revolution.

WHERE WE STAND TODAY

The Clinton Administration has taken the initiative of presenting a national vision for the information superhighway. Its September 1993 strategic plan, *National Information Infrastructure: Agenda for Action*, states that "all of the Administration's policy initiatives are aimed at promoting the transition towards high-wage, higher-value 'new work.'"[24] In addition, the Administration has taken an important first step by setting the goal to have every classroom, library, hospital and clinic "connected" by the year 2000.[25]

Further, a number of telecommunications companies, including Bell Atlantic and Pacific Telesis have committed significant sums of money to build a network connecting public institutions, including schools, in their service areas. (However, this often does not include wiring classrooms.)

As positive as these goals and promises are, they fall far short of a true strategic plan: one that establishes the priorities and the particulars of universal reach, backed by the necessary financing to guarantee that every classroom, library, community center and home has adequate hardware, software and access to the superhighway. Recognizing that this ultimate goal will take a number of years to achieve, there must be a step-by-step plan and timetable for achieving it. Neither now exists nor has been proposed.

CONCLUSION

The economy and the workplace are already being transformed by telecommunications technology. It is important for the nation to look ahead and actively prepare its youngest citizens to be full participants in the civic and economic life of the future.

Just as Americans made a national commitment to the space program in the 1960s, so it is in our national interest to develop a plan and dedicate sufficient resources to a program which ensures that every child and family has access to the new information resources they need — through public-private partnerships which link schools, libraries, community centers and homes into a nationwide system.

IV

CHILDREN AND NEW TECHNOLOGIES: IN THE SCHOOL

There are thousands of buildings in this country with millions of people in them who have no telephones, no cable television, and no reasonable prospect of broadband services. They're called schools.
—*Reed Hundt, Federal Communications Commission Chair*[1]

INTRODUCTION

Ever since the 19th century, schools have been the cornerstone of the effort to ensure that each American child has the opportunity to learn what he or she needs to be an active and productive citizen. Today, the nation's schools represent the most effective way to reach all of America's children and teach them the skills and knowledge they will need for the challenges of the 21st century.

This chapter outlines examples of interactive multimedia and telecommunications in classrooms and school libraries, and what is known about their effects on education. It also identifies the children likely to be left behind, and discusses the lessons to be learned from efforts to bring computers into schools in the 1980s. It closes with directions for change.

This examination of the new technology challenges confronting schools, makes clear that low-income children are disproportionately at risk of being left behind. Because low income families are less likely to have new technologies in the home, and low income schools are usually ill-equipped with communications systems, these children face a doubly acute risk of information isolation. As we have seen, this has implications for future job prospects and other areas of life.

EDUCATION AND INTERACTIVE TECHNOLOGY

Interactive multimedia and telecommunications technologies can be applied to classrooms and school libraries in different ways: as new learning and discovery tools for children; as a way of preparing children with needed skills; and as creative teaching and classroom management tools for teachers.

Elements of interactive media in the classroom include:

- *Preschool software:* Computer programs and systems that help preschoolers learn to read, write and conceptualize. Using a simple keyboard or a touch-sensitive screen, the computer can present images of letters, animals or other objects. Many systems can also recognize and repeat sounds.
- *Educational software:* Computer programs that enable children to learn math, spelling, geography and other subjects, often in the form of a game or adventure. Software for both individual and collaborative learning exists.
- *Computer simulations:* Programs with sophisticated graphics and commands that let a child practice real-world knowledge and decision-making skills to, for example, plan and manage a city, excavate an archaeological dig or explore the intricacies of an ant hill.
- *E-mail (Electronic mail):* Typed messages sent from one computer screen to another along a network linking the units. Transmitting messages from one computer to another offers children the ability to instantly communicate through written messages with scientists, teachers, other students and friends anywhere in the world.
- *On-line services and the Internet:* Bulletin-board services and databases which give children access to vast amounts of information and enable them to interact with other people around the world.
- *Graphics:* New creative tools allowing children to draw and to design their own original art and other imaginative creations.
- *Distance learning:* Students in remote locations taking classes or visiting museums and libraries

 Director of U.S. Patent Office asks the President to eliminate the agency because "everything that can be invented has been invented" • 1900: 5% of American homes have a telephone.

with live television, cable, computer or satellite hookups.

- *Electronic Portfolios:* Keeping electronic records of a child's work, which allows teachers and students to have easily accessible information.

Schools Are Already Moving onto the Highway

In 1993, the nation's public and private schools invested $2.1 billion in personal computer technology,[2] with millions more invested or promised by cable and telephone companies. Today, thousands of individual schools use on-line services, as well as multimedia teaching aids that have been purchased, donated, or, in some cases, developed by the instructors themselves. Computer companies and software developers often work with school districts, providing workstations and programs for free, or helping administrators acquire materials at reduced rates.

- A new distance learning program in Bethel and Danbury, Connecticut, uses interactive television to link two high school Russian classes. This allows one teacher to teach two classes of seniors separated by several miles. The service, which was provided by Comcast Cable, will expand to other Western Connecticut high schools and a vocational technical school by the end of 1994.[3]

- The Port Hueneme School District, part of California's "Model Technology Project," has linked 10 classrooms in several schools and offers a series of computer, multimedia and audio-visual courses. An 11th multimedia classroom, devoted to math, will be ready by January 1995. In the five years the program has operated, more than 7,600 elementary and junior high school students have participated. Some improvements in reading and writing abilities, as well as in overall achievement scores, have been noted.[4]

- The school libraries in Charlottesville, Virginia, are putting all of their catalogues on-line and offering students daily lessons in computer literacy.[5] The Queens Library in New York offers dial-up access to InfoLinQ service from home, school or office to anyone with a personal computer and modem, so that students, parents and teachers can access the library catalog, get information about library events, and examine a periodical database of 1,800 magazines. Students in Tucson, Arizona, can use personal computers at home to access their library's card catalog on a 24-hour basis.[6]

- In Oakland, California, second-graders at the Lockwood School work in labs with computers and headphones, practicing reading, writing and comprehension. Early results indicate that the students are reading at their grade level, which their teachers say is uncommon for children in this economically-depressed community.[7]

- Computer literacy is being promoted by several states, including North Carolina: "This year's sixth graders, the Class of 2000, must pass a three-hour computer proficiency test by the end of their senior year to get their high school diploma. They will have their first shot at the state exam in two years, as eighth graders, and they are already preparing."[8]

Teachers at the Center

Of course, no technology can take the place of a dedicated teacher or school librarian. And no technology will work in the classroom without a trained teacher, supported by a well-planned system. For teachers, the new technologies offer the possibility of restructuring classroom activities, leaving more time for helping individual students.

Early Studies, Preliminary Results

Early studies of the impact of the new technologies on children and education are beginning to be issued by various organizations. Much of the early research has been conducted by the software industry,[9] and while it is useful, it should be validated by independent researchers. Among the initial findings:

- A five-year report (1987-1992) by the Sacramento School District in California found that students using multimedia and telecommunications

showed improved attitudes toward reading, social studies and science, and became more active and independent in learning. Some also showed improved reading scores.[10]

- A survey of 550 teachers who use telecommunications technology in the classroom reported that "inquiry-based analytical skills — like critical thinking, data analysis, problem solving, and independent thinking — develop when students use a technology that supports research, communication, and analysis." However, "...telecommunications does not directly help their performances on state- or city-mandated tests."[11]

While these results are encouraging, it should be emphasized that interactive and multimedia educational programs are fairly new, and we found no nationwide evaluations regarding the effectiveness of interactive or multimedia instruction.

SPECIAL CONCERN

While 92% of students use a computer in school at some point during the school year, and more than one-third of the nation's classrooms have at least one computer,[12] other statistics demonstrate a technological gap:

- 27%-39% of all students report that computers are frequently unavailable at school.[13]
- The top 20% of schools (i.e. those with the highest ratio of computers to students) have nine times as many computers as schools in the bottom 20%.[14]
- 80% of all school computers are considered "obsolete" by the Department of Commerce's Information Infrastructure Task Force.[15]
- Only 12-14% of U.S. classrooms have a telephone line; in other words, fewer than one classroom in seven has the capability of using a modem and phone line to connect a computer with the Internet or any other on-line system.[16]
- California ranks 49th in computer-to-student ratio, a particularly unfortunate fact considering one in eight children in the United States lives in California.[17]
- American students rank behind Austria, Germany and the Netherlands in practical computer knowledge.[18]

Are Girls Being Left Behind?

Although the gap between boys' and girls' use of computers is not as extreme in the U.S. as it is in other countries, boys use computers more than girls, and video games for home computer use are overwhelmingly marketed to boys.[19] In addition, 85% of computer game users are boys; and 85% of people using the Internet and other on-line services are male. Among home users of personal computers who use on-line services, 69% are male.[20]

In a recent study, home computers with modems were more prevalent among teenage boys than teenage girls, and girls were 6% less likely to have a computer at home. In homes with computers and modems, the amount of time spent on-line was not related to gender, although girls did use home computers for schoolwork about one-third more than boys.[21]

When computer use in elementary school is non-elective, there is little statistical difference between boys' and girls' use or ability. However, games are overwhelmingly aimed at boys, something the video game industry recognizes but has done comparatively little to change.[22] (Since women in their 30s who use computers are 12 percentage points more likely than men to play computer games,[23] there is clearly an untapped market waiting.)

Studies show that by the mid-teen years, when computer courses are typically elective, girls begin to lose interest in computers at school, and "the gender gap continues to widen through college and graduate school."[24] Women, while comprising more than half the population, are consistently underrepresented in scientific fields, receiving only

Theory of Relativity published • 1907: 6 million telephones. First commercial color film. 2 million daily admissions to 5,000 nickelodeons nationwide • 1908: New York City police close

15% of Ph.D.s in mathematical science, 14% in computer science, and 8% in physics.[5] Clearly, there are underlying influences in our educational system and society that must be addressed. Without affirmative steps to bring girls into the new technologies, their lack of experience will likely become a barrier to successful economic futures.

LESSONS FROM HISTORY

In the 1980s, computers began to appear in classrooms in significant numbers. The expectation was that technology would transform our children's educational experience. For too many children, it didn't happen. Some of the reasons for the limited success include:

- *Failure to fully enlist teachers.* Most teachers had not grown up with computers, and some were uncomfortable with them. Many teachers did not have enough time (or support) to become accustomed to using computers, and a proper assistance program was not in place. In addition, some studies indicate that it takes a teacher five to seven years to become familiar enough with a technological learning system to effectively guide students.
- *Failure to integrate technology into the classroom.* Computers were often set up in isolated labs which children would visit once a week. These computers often simply mimicked traditional workbooks, with text on a screen instead of a page. Now, educators are integrating interactive multimedia and telecommunications technology right into the classroom. Just as reading is an integrated part of the class day, integrated technology can become a core tool for schoolwork.
- *Failure to fully involve parents.* Many parents in the 1980s also had not grown up with computers, and many were not educated about their use or value. As a result, many students lacked the at-home encouragement necessary for successful learning. New efforts recognize and utilize the important role parents' enthusiasm and support can play.
- *Failure to provide a support system.* Computers in classrooms rarely were accompanied by adequate ongoing training and technical assistance. Many schools had a janitor who could fix the boiler, but nobody to call when the computer broke down, or when a program or command was not easily understood.
- *Failure to develop appropriate software.* Early software was very limited and often difficult to use. There have been tremendous advances in the technology, content and user-friendly nature of the software, which have created the incentive for teachers and children to use it. Even with these advances, the field is still young and there is a great deal of further research and development that can be done to improve children's software.

Other experts cite as reasons for limited success everything from an insufficient number of printers, to insufficient time for teachers to develop lesson plans.

WHERE WE STAND TODAY

Troubled Waters

While schools represent the most practical way to reach and teach children information literacy, there are significant challenges to achieving that goal. Schools are coping with many other serious changes, from violence in classrooms and on school-grounds, to increasing numbers of children who are hungry, abused, neglected or not ready to learn, to major restructuring of administrations and classrooms.

Moreover, most schools are strapped for funds, as new demands like security and budget cutbacks have eroded school funding. Schools face difficult choices about spending their funds — such as whether to cut back on physical education programs or basic classroom supplies.

While only a start, some new funds for bringing technologies into the schools are becoming available. The recent Goals 2000 legislation, for example, contains funding for technology in the schools.[6] Furthermore, private philanthropy and businesses are investing in schools. The most notable recent example is Walter Annenberg's $500

million commitment to encourage public school reform, including efforts to integrate technology into the classroom.[27]

Goals 2000: Setting the Expectations

With the passage of the Goals 2000 legislation, state education agencies, school administrators and parents are paying increased attention to the defined competencies children are expected to learn. While these goals provide an important new opportunity to focus on educational outcomes for students, it is notable and unfortunate that the goals fail to specifically address the needed new information literacy. In order to encourage educators to view it as a priority, this important competency should be added to Goals 2000, along with a practical plan for achieving this goal.[28]

CONCLUSION

> Businesses are spending billions training people because they don't learn how to use technology in schools. From a national-policy perspective, there should be the highest priority around these issues . . . . The answer can't be that technology is too expensive so we're just going to keep classrooms the way they were a hundred years ago.
> —*Roy D. Pea, Dean, Northwestern University*[29]

Technology literacy will surely have a great influence on whether American children are competitive in the global economy of the Information Age. But there is as yet neither a national policy nor leadership defining how we will ensure that the 47 million elementary and secondary school students in the United States master this new literacy.

Schools cannot do the job alone. Americans should expect the best education possible from public schools, but what is needed in order to achieve this is an adequate commitment of resources along with the active and supportive involvement of the private sector, federal, state and local governments, and parents.

V

CHILDREN AND NEW TECHNOLOGIES: IN THE HOME

Let's say I am sitting at home wondering about some new drug that was prescribed to me. Or wanting to ask a question to my children's teacher. Or curious about my Social Security status. Or wondering about crime in my neighborhood . . . . Or I want to ask people who read a book what they thought of it before I take my time reading it. In all of these cases being able to reach out and communicate by using a messaging or bulletin board type system lets me do something I could never do before.
—*Bill Gates, Chairman, Microsoft Corp.*[1]

INTRODUCTION

The home is the nexus for new technologies. It is where schoolwork, entertainment, information gathering and communicating with friends and family take place. It is also where many marketers are aiming their sights, though consumers will ultimately determine what is delivered into their homes. Already, sales of home learning software have increased over 40% during each of the past two years, with sales projected to increase to $1 billion by the year 2000.[2]

This chapter focuses on some of the ways new technologies affect family life at home, describing both new benefits of interactive technologies and new responsibilities for parents, guardians and young people themselves.

At Home on the Highway

New technologies are a part of millions of households in America, allowing more and more people to work at home, and increasing their entertainment and home education options.

- In early 1994, approximately 11 million households had the equipment necessary to go "on-line"; that is, they had at least one computer with a modem.[3]
- 39% of households with children have a personal computer;[4] 35% of all households have a computer, a figure expected to rise to 50% by the year 2000.[5]
- Over 90% of all children at least occasionally use a computer outside of school — if not in their own home, then presumably at a friend's or relative's house or office.[6]
- 68% of households with children have a video game system.[7]
- 700 home educational software titles are on the market in 1994; 250 additional titles are projected to be released annually.[8]
- 85% of all households have a VCR.[9]
- 63% of all households have cable TV.[10]
- 90% of all households — and 96% of all households with cable TV — have a TV remote control.[11]
- 33% of the entire U.S. workforce worked part- or full-time at home in 1993, up from 21% in 1988, with the vast majority of these workers using technology to make it possible.[12]

Programming: A New Era

For families who can afford them, there will be new options. The programming becoming available for home entertainment and the way consumers will select it is more analogous to going to a home-based electronic bookstore than to watching broadcast television. Just as a consumer can choose a book, magazine or newsletter and either buy or subscribe to it, families will be able to select from a broad

The Children's Partnership

Gallup survey of what people like to read in newspapers: picture page 85%, comics 70%, editorial cartoons 40-45% • 1922: 30 professional and 15,000 amateur radio stations; 100,000

range of materials — from movies and documentaries to sporting events, and from information about parenting to information about the latest commercial products.

Families will bring their choices directly into the home, on videotape or CD-ROM, by subscribing to cable, satellite or other services, and perhaps by dialing up movies and videos on demand from their local telecommunications company.

In addition, families can subscribe to on-line services, giving them access to new communications and information options.

With these greatly expanded programming and information options comes the added responsibility for parents and programmers to understand the unique sensitivities of children with regard to interactive media.

INTERACTIVE MEDIA AND CHILDREN'S SOCIAL AND COGNITIVE DEVELOPMENT

> One can count on children to know less about most topics, to be more interested in learning about many things, and to be more restricted in their ability to understand and learn.
> — *Aimee Dorr, UCLA Graduate School of Education*[13]

Decades of child development research and 40 years of research on children and television have made it a widely accepted fact that children do not acquire and use information or respond to media in the same way as adults.[14] Children are a special audience, and must be treated as such.

Age-Appropriateness

There are important and distinct age groupings among children that reflect significant changes in their cognitive and social development. For example, young children are most scared by things that look ugly or move strangely, like monsters. Older children (aged 8 to about 12) are most frightened by real threats that they perceive can happen to them, like the death of a parent or a kidnapping. Adolescents are most afraid of abstract situations such as war.[15]

Taking these changes in maturity into account, child development experts and specialists in children's programming agree that there are natural age groupings which predict how children will respond to a product, how they will use it, and how appropriate it is for them. The following age groupings can be used by media developers in designing age-appropriate material, as well as by parents and teachers in inquiring about the appropriateness of products.

- Preschool — ages 2 through 5
- Early elementary — ages 6 through 9
- Preteen — ages 10 through 12
- Teen — ages 13 through 16
- Young adult — ages 17 and over[16]

Social Development

Many experts believe that, like television, interactive multimedia can influence children's social development in both positive and negative ways. On the positive side, TV programs such as *Captain Kangaroo* and *Mister Rogers' Neighborhood* received much praise over the years for gently introducing children to concepts like friendliness and responsibility, and many recent home educational programs encourage children to learn to work together.

There have also been many studies demonstrating the negative effects of television, particularly regarding violent programming, which can make children numb to the brutality of violence, or frighten them, or, in some rare instances, incite them to violent behavior.[17]

Violence and Video Games

The available research on video games and violence is far less extensive and is full of contradictions. While some studies seem to indicate that aggressive games promote aggressive feelings or actions,[18] others suggest that video game violence has little effect, at least in the short-term. Still others suggest that active participation in video games may, in fact, have a cathartic effect, releasing anger and frustration.[19] Some studies suggest that children, especially boys, with aggressive tendencies and undeveloped social skills are more likely to be drawn to playing violent or aggressive games;[20] others report that there is no clear connection.[21] Further research in this area clearly needs to be carried out.

Diversity and Stereotypes

Another consideration, from a child development perspective, is the way media can convey either positive role models or negative stereotypes through characters, storylines and situations. Children's understanding of the roles of men and

radios sold, average cost: $50 • 1923: 500 professional radio stations; 15% of radio stations are owned by churches • 1929: 100 million weekly movie-goers; 4 million radios in American

women, or of particular racial or ethnic groups, can be strongly influenced by the characters they see on TV. According to a 1980 study, for example, girls who watched the most television had the most negative attitudes toward their own gender.[22]

Lack of availability of material for children of diverse backgrounds is another area where software development lags. Children, in particular, need to experience positive role models of their own race and ethnicity. Software and other interactive programming that reflects America's rich variety of cultures, customs and backgrounds will help prepare our children for the real world they live in, and will also give families of minority cultures their own place and source of identification on the information superhighway.

Learning and Socialization

Excessive time with media can take time away from learning and playing with other children. While little is known about the effects of interactive media in this regard, there is at least some evidence that children who watch a lot of television put less effort into their school work, read less well, play less well with others, have fewer hobbies, and are more likely to be overweight.[23] Another study found that adults "who watched less television had higher literacy scores."[24]

Advertising and Children

While adult viewers armed with a remote control frequently change channels as soon as the commercials come on, this is not true for young children, who are often unable to identify commercials.

> Studies confirm that children age eight or younger are unable to distinguish between television programming and commercials.... they do not understand that the purpose of the commercial is to create product demand.[25]

Yet with children spending $66 billion a year of their own money, and influencing $132 billion a year of their parents',[26] marketing for both youth and adult products is increasingly directed at children. Advertisers spend an estimated $800 million annually targeting children through television,[27] with the top spenders being convenience-food manufacturers, toy companies and fast food restaurants.[28] Advertising agencies are forming special "kids' divisions," targeting young people from 18 all the way down to 3: "The general rule of thumb is, when a kid is 3, you can go after them on television," said Deyna Vesey, Kidvertisers' Creative Director.[29]

In fact, studies show that children begin to recognize brand name items at the age of 2. Even if a child does not understand the difference between a commercial and regular programming, he or she will "get" the message and plead for the product. "Make a kid feel like he rules the universe, and he will likely desire the product that makes him feel that way," according to Andy Bohjalian of Grey Advertising.

One demonstration of the power of advertising on young people is the case of Joe Camel, a cigarette advertising campaign by RJR Nabisco. Camel had a 1% share of the illegal children's cigarette market before the campaign, and a 32% share after seven years of advertising.[31]

The inability of children to distinguish between a program and a commercial is exploited by entertainment shows which function as 30-minute advertisements for merchandise. Marketing of licensed toys and other products continues to drive children's television programming today, with product-related shows accounting for the vast majority of new production.[32]

The Shift to Interactive Advertising

With the growing use of interactive multimedia and telecommunications technology, advertisers are anticipating a new era with changed strategies for selling products. Sophisticated use of databases which capture precise details of people's consumer habits, combined with the ability to speak "one-on-one" with an individual over a personal computer or an interactive TV, will mean that marketers can "narrowcast" their pitches.

"We can use interactive technology to engage consumers in our commercials.... We can target not just demographic segments but individual households. If a family has a newborn baby, we can make sure they get a Pampers commercial. We can

homes; $4 million worth of advertising time sold to radio stations • 1930: Radios in 50% of all homes • 1931: About 1% of cars have radios • 1933: Franklin D. Roosevelt starts his "fireside

use games, infomercials, video shopping malls.... and if we do it right, we can keep people in their seats when the commercials come on," said Edwin Artzt, Chairman, Procter & Gamble.[33]

Advertisers are exploring everything from magazines that can be customized to individuals, to "intelligent agents" that can be programmed by the consumer to search out a specific item among a multitude of shopping databases.

This year, Sega is coming out with its own cable channel; households will pay for the service on a monthly basis and will purchase the equipment needed to play the games on their television. Movie previews can now be "downloaded" from various on-line services; and dozens of companies are trying to place ads on computer networks. MTV is developing its own home shopping channel; and developers of "virtual reality" programs talk enthusiastically about "interactive" ads that transport children into a computerized play environment.

Responsibility and voluntary standards of appropriate presentation for children may be expected of producers and marketers; however, history makes it quite clear that government regulations and enforcement — or the threat of such action — is often the most effective motivator of market behavior that protects the public interest of children.

"A system designed to serve the needs of advertisers will not on its own generate adequate programming to serve the cognitive and emotional needs of children," according to the Center for Media Education.[34]

Other New Threats

New technologies present other new threats to children. For example, because of the nature of some on-line services, which allow people to hide their identities behind an on-line access name, unsavory (or even dangerous) people can reach children — even in their own homes. Protections from these new threats should be planned by the architects of the superhighway.

- In early 1994, Massachusetts police charged a man with raping teens and preteens after enticing them through a notice he posted on a local computer bulletin board. The state has seen "a rash of cases involving high-tech-pedophilia in recent years."[35]

- Due to the danger of "stalkers" and others with aliases communicating with children on various "nets," some on-line services (America Online, Prodigy and CompuServe) allow parents to lock their children out of parts of the system.[36]

- Several groups of people on Usenet exchange pornographic pictures of children; and pedophiles have their own "support group" on the network.[37]

The Increasingly Important Role of Adult Supervision in a New Media Environment

There is some evidence that children's home lives affect how vulnerable they are to negative messages in the media. It appears that, in violent or abusive homes, children may be more influenced by media violence. Conversely, where home and family life reinforce positive behavior, negative media messages are likely to have less effect on the child.[38]

As important as it is for parents and guardians to be active in and informed about interactive media in their children's lives, it must also be recognized that more and more children of all socioeconomic levels are spending time at home without adult supervision.

- American children spend an average of 10 to 12 fewer hours a week with their parents than they did in 1960.[39]

- Nearly half of American adolescents have no structured, supervised after-school activity, leaving them without guidance in viewing or using the new media.[40]

New Era for Adult Supervision

Moreover, the era when parents could rely on the fact that they were familiar with what children were watching on television (from their own experience), or could quickly and easily monitor the screen, is passing. As more children use on-line services and interactive software, parents and guardians will

find a need for increased vigilance, both in setting appropriate time limits and in guiding children toward age-appropriate materials.

SPECIAL CONCERN

Access for All Children

Recent figures indicate that interactive technology is most likely to be used in well-educated, upper-income families, illustrating a troubling trend regarding access for all children.

Parents' Income Related to Children's Use of a Computer at Home:

- 48% of all households with incomes of $50,000 or more have a child using a personal computer.[41]
- 7% of households with incomes under $20,000 have a child using a personal computer.[42]

Parents' Education Related to Children's Use of a Computer at Home:

- 49% of college graduates with children reported that their children used a personal computer.[43]
- 16% of those with a high school education or less reported that their children used a personal computer.[44]

Race Related to Children's Access to a Computer at Home:

- 32% of white households have a child using a personal computer at home.[45]
- 18% of African-American households have a child using a personal computer at home.[46]

While it is still early in the dissemination of these technologies, it is important to recognize these trends and compensate for the failure of market forces to reach children who may be left behind.

LESSONS FROM HISTORY

Strong Media Advocacy Delivers for Children

Over the past 45 years of public advocacy for children's television and consumers' rights, there have been important advances. It is not at all clear that these protections will be extended to the new media.

Broadcast Television:

- Ban on cigarette advertising.[47]
- Children's Television Act of 1990 (requiring broadcasters to serve the educational and informational needs of children, including programming specifically designed to do so, as a condition of license renewal).[48]
- Reduced minutes of advertising per hour of programming directed at children 12 and younger (10.5 minutes/hour on weekends, 12 minutes/hour on weekdays).[49]
- Network standards that screen for inappropriate content.[50]

Other Advertising:

- More detailed nutritional information on food products, and commercial "fine print" like "batteries not included."[51]

Cable:

- Advertiser-supported cable channels follow the broadcast networks' guidelines for limiting commercials during children's programming.[52]

Television Sets:

- Approval of the V-chip proposal, which would allow parents to "block out" unwanted programming.[53]

Telephone:

- Blocking devices for parents to keep their children from accessing pornographic services.[54]

The principal lesson is that all of these protections came about as the result of vigorous and sustained advocacy. Only when there is an active voice for children will their interests be protected.

Children, Media and the First Amendment

America's children benefit from living in a society with free and open speech. At the same time, this makes protecting them from inappropriate information a difficult challenge. Since the introduction of television broadcasting nearly 50 years ago, there have been repeated efforts to both require educational and informational programming for children, and to channel indecent programming to late hours when parents can reasonably be expected to supervise children's viewing. While some regulations have been sustained, they have generally had to pass scrutiny by the courts, to make certain they do not violate First Amendment protections of free speech.

In the new telecommunications and media environment, the problems of protecting children become more difficult as programming options

multiply and the consumer becomes more active in choosing the content. Moreover, the hard-won gains in children's broadcasting are at risk of being lost in the move from the limited broadcast spectrum to the virtually unlimited electronic delivery systems.

Radio and television airwaves were regulated, in part, because they were considered to be scarce resources and public property. Cable and other forms of entertainment and information delivery, while ultimately finite in their capacity, are not "scarce." And, since households pay for these additional services (unlike radio or broadcast television), they are essentially private rather than public.

These unresolved legal and regulatory issues surrounding new media have enormous implications for children.

WHERE WE STAND TODAY

Whether we like it or not, television and the new media occupy a very significant place in the lives of most of America's children. Today in the United States:

- By the time youngsters graduate from high school they will have spent more time in front of the television (nearly 20,000 hours) than in school (approximately 16,000 hours).[17]
- By the time youngsters graduate from high school they will have seen approximately 20,000 commercial messages on television.[18]
- On average, American children who have home video game machines play with them about one-and-a-half hours a day.[19]

Promising Developments for Children

Ratings, Consumer Information and the New Media

Several important efforts are underway to develop standards and protections suitable to children for video games and other software. For example, the Software Publishers Association (the national trade organization representing over 1,100 software publishers of business, education and consumer applications) recently issued its first ratings systems,[20] as did the Interactive Digital Software Association, a trade association for video game makers.[21] These ratings are expected to appear on the packages of products introduced in the fall of 1994. These are potentially useful efforts which will give consumers valuable information to use in evaluating the contents of the new media.

As important as these efforts may be, however, the ratings are being developed by industry leaders who have a commercial interest in the outcome. It remains to be seen whether self-interest will skew the development of these ratings away from children's best interests. In addition, there is a danger that the use of two different ratings systems

will confuse parents trying to find their way through the complex field of new products.

Finally, and perhaps most importantly, while ratings provide information enabling parents and young people to avoid inappropriate materials, little guidance is available for parents and other consumers who want to know the best products to buy. The Coalition for Quality Children's Video, based in Santa Fe, New Mexico, has begun work in this area; and "best choice" awards are periodically presented by parenting magazines and the software industry. However, with hundreds of titles on the market, consumers will need independent and reliable sources of ongoing information, along the lines of *Consumer Reports*.

Home Protection: Lock-Boxes

Parents concerned about objectionable programming on television may soon have technical solutions. Digital television that allows subscribers to program what is receivable on their set is becoming available, as are devices using "blocking technology" which would allow viewers to block out the transmission of certain material deemed too violent or offensive. A blocking device, called the "V-chip," may be incorporated in future television sets. In addition, the broadcast and cable television industries are also moving to adopt self-regulations to curtail violent programming and to avoid Congressional action.

radio as their primary news source; Paperback book invented • 1940: 25% of cars have radios • 1945: Atom bombs dropped on Hiroshima and Nagasaki; Communications satellite

However, while TVs with the new technology may be on sale by 1996, some problems remain. The technology will only block programming if every program transmission is electronically coded for potential blocking. There is also some concern that low-income families who cannot afford new televisions will not have access to the blocking technology.[xi]

CONCLUSION

Americans cannot take for granted that there will be an ample supply of high-quality and appropriate content available at little or no cost to all children. The new media environment will require increased vigilance on the part of parents and guardians — at home and in the marketplace. Advocates will also need to take actions to seek new public policy, technological and other solutions.

proposed in a science fiction magazine • 1946: TV in 8,000 homes • 1947: Sound barrier broken by Chuck Yeager • 1948: The LP is introduced by CBS, 1.25 million sold in 6 months •

VI

CHILDREN AND NEW TECHNOLOGIES: IN COMMUNITIES

INTRODUCTION

An African proverb reminds us that it takes an entire village to raise a child. The community provides children with a place to play, and a place to learn, a place to connect with friends and neighbors, and a place to go when they're sick. The community is also where their parents obtain family resources and services.

Technology must be integrated into communities in ways that adapt to their indigenous needs and structures. Nearly every community has a place where people can find information they need for their home, work or civic life: a community or cultural center, a place of worship, a social service center, a teen center or a public library. With interactive multimedia and telecommunications, such places could link people up with vital information, services and expertise more effectively than ever.

The new technologies can also transform the very concept of community, allowing people with similar needs or interests to meet and communicate with each other in new ways, regardless of location.

These potential advantages come with important cautions as well. Experiments with these new technologies have shown that success is not always easy or guaranteed. For example, businesses, nonprofit organizations and government agencies have sometimes made very expensive mistakes in purchasing or developing hardware, software and systems. Clear goals, realistic expectations, expert advice and ongoing technical support are indispensable to communities trying out new applications.

This chapter explores different ways in which communities are using interactive multimedia and telecommunications technology, recognizing that in this period of experimentation little is known definitively about what works and what does not.

Health Care

Health care is one of the fields in which uses for information technologies are developing most quickly. "Telemedicine" lets physicians and other health care professionals share information electronically, enhance medical training and even make diagnoses from a distance:

> A boy who had been injured in a serious car accident in rural Idaho was taken to the emergency room. The ER staff suspected a fracture, but the nearest radiologist was 90 miles away. An X-ray was taken, then sent through a phone line digitizer to a radiologist's personal computer screen. The "distance diagnosis" provided good news: no fracture.[1]

An increasing number of multimedia medical encyclopedias, childbirth and child health guides, and other medical materials for home use are available on video, CD-ROM or on-line. Bulletin boards allow families with special health problems to get in touch with each other and share advice and experiences, as well as provide access to important medical data, research and experts.

In addition, new technologies can also play key roles in strengthening public health efforts. They can provide information to families that have gone without health care, as well as help medical personnel target children who need immunizations or other necessary care.

> In Cleveland, Ohio, a completely automated computer system is being set up to help immunize children. The system registers, tracks and facilitates follow-up primary care visits for children two years and older, and is soon expected to do the same for every child born in the metropolitan area. The system also "furnishes a voice mailbox to each family enrolled . . . notifies parents of scheduled physician visits and visits with other health care workers, and provides patients and their families with periodic health education and promotional messages."[2]

Electronic sharing of medical information and uniform electronic billing are beginning to be used by some health care providers. Many experts believe that telemedicine and other technological

1949: 1 million homes have television; The remote control is introduced by Zenith; The "45" is introduced by RCA; Reading expenses as percentage of total earnings: 1.6% • 1950:

advances will not only improve care but will also reduce costs. It has been estimated, for example, that the state of California could save $2.6 billion in annual health care administrative expenses by using an electronic data interchange system.[3]

Disabled Children

For children with disabilities, interactive multimedia hold exciting new opportunities for accessing the larger community, a fact recognized by the Technology-Related Assistance Act of 1994, which authorized $68 million to help the disabled use new technologies at home, school and work. Among the possibilities for disabled children presented by the new technologies:

- Students with speech and visual impairments can communicate via computers that have speech-output capacity.[4]
- Breath-activated computers can allow young quadriplegics and others with limited mobility to write, create and interact with other members of the electronic community.[5]
- Distance learning can offer educational experiences a disabled child would not otherwise have.[6]
- Virtual reality can open new areas for art and design, even for completely immobilized children.
- E-mail and on-line services can allow disabled people to form a virtual community through which they can meet and interact with other disabled people, becoming part of a much larger community.

These systems are being tested in various parts of the country, but widespread use will only come after further research, in some cases, and adequate funding, in all cases.

Public Libraries

For two hundred years, the public library system has provided centers for information and research. There are over 115,000 libraries in the United States, more than 15,000 of which are public library outlets — the highest number per capita of any country.[7] Every year, about 24 million children aged 3-8 visit a library,[8] many of which offer access to the information superhighway:

- Of libraries serving populations of over 100,000, 79% provide CD-ROMs, and 62% have microcomputers for public use.[10]
- 21% of public libraries have Internet connections.[11]

However, despite their important role, libraries are constantly facing budgetary restrictions and cutbacks, and the per-call cost of using on-line systems is a great impediment to providing the public with superhighway "on-ramps."

In rural and remote areas, library services are generally extremely limited. Rural libraries are often few and far between, and many lack computers for public use; rural libraries also tend to lack other services which libraries serving larger populations often provide, such as CD-ROMs and remote database search capabilities. Internet access is provided by 77% of libraries serving populations of more than 1 million, compared to only 13.3% of libraries serving populations under 5,000.[12]

Connecting Schools, Home and the Community

Many programs are beginning to link the places where children live, learn and play.

- The New York City Public Schools started a computer bulletin board service (BBS) in 1982 with one computer and a phone line. The BBS has grown into a 24-hour, 7-day-a-week citywide service, providing information services and Internet access to students, teachers and parents throughout the city school system. The system can be called up from classroom or home computers, and most school libraries have a computer and modem for such access. Voice-mail service is also offered for parents to communicate with teachers. The long-term goal is to connect the school computer system with

50,000,000 telephones—one for every three people. Diner's Club, the first credit card, is introduced • 1950s: In cities where many people have TV, movie attendance drops 20-40% •

every other city service, although funding for this expansion, as in so many similar cases, has been problematic.[11]

- N.E.T., or Northcoast Electronic Town, is a private, independent, interactive system connecting people in five counties in Northern California. Offered free to schools, libraries, hospitals and local governments, it provides E-mail, Associated Press wire services, and access to others on the Internet for people who live in remote communities. Subscribers can check a BBS for social events in the area, and young people can exchange views on the on-line forum, "Northcoast Teen Topics."[12]

Creating New Communities

One of the most profound new elements of these technologies — and one whose eventual outcome no one can fully envision — is their ability to create communities that are not bound by time or place. Following are some examples of such uses:

> SIGKids allows young people to work and play together with the world around them. An annual "learning lab and art show," SIGKids was originated by a video producer concerned about her daughters' education. The SIGKids shows, presented at multimedia conferences and conventions, recently featured "CitySpace," where 200 teachers, parents, kids and mentors worked with each other across the Internet to design and "build" an imaginary city.[13]

All across the country, people with similar interests are using computer networks to communicate and even work together on projects. CompuServe, America Online, Prodigy, GEnie and Delphi are among the most popular commercial systems. But municipalities and nonprofits are participating too:

> With HandsNet, 3,000 child-serving agencies and advocacy organizations are using the new media to keep each other informed, seek advice, and work from remote locations on joint projects. HandsNet and other such networks are also beginning to be used to quickly mobilize large numbers of people to get involved on budget issues and decisions related to hunger, homelessness and a variety of social issues.[14]

> "Free-Nets" are access groups providing electronic "portals" or "gateways" to various databases (some with Internet access) for the price of a local phone call. These groups, often set up by volunteers across the country, are part of a growing movement to make the information superhighway affordable to all Americans.[15]

These networks and others provide on-line tools for advocacy and community action. The advantages of civic networking — using computers and electronic networks for exchanging E-mail, vital information and action alerts — have been demonstrated by advocates working in a wide range of fields.

Making Government Services More Efficient and Accessible

Information technologies also offer new tools which can make services more convenient for families, through one-stop centers or better case management. Uniform data collection and reporting forms, shared electronically, enable physicians, teachers, caseworkers and other professionals working with an individual child to benefit from more complete information, without great expense and inconvenience to the family.

> A July 1993 U.S. Department of Agriculture report described the electronic issuance of food stamp benefits in two counties: recipients were given a plastic card (similar to a cash-machine card) which debited their personal food stamp account when they made a purchase. In the test counties, the system reduced cost to the government and reduced fraud.[16]

Children's leaders are also beginning to look to the new technologies as tools to provide prompt referral services for families seeking various forms of help. Electronic public kiosks and on-line information services are beginning to provide families with practical information regarding what government programs they might qualify for, or where to find appropriate child or health care.

> The interactive Community Services Workstation at the Howard University School of Social Work in Washington, DC provides an on-line computer service that allows low-income clients, with the help of staff members, to "navigate through medical, health, social and mental health support systems, and interact with workers in each program — all in one visit."[17]

1951: 10 million homes have TV • 1952: Nixon's "Checkers Speech" demonstrates the power of TV • 1954: More radio sets in the world than newspapers; TV advertising surpasses radio

After-School Recreation Centers

The new technologies can make new after-school activities possible, by transforming youth centers into places where young people can play interactive games, access on-line information to research homework assignments or communicate with young people in other places. Centers that have already begun to move in this direction report that the technology is a very effective way to engage young people.

> The Youth Service Center of the Los Angeles Urban League provides "a safe place to do homework, classes in computer literacy, and one-on-one tutoring for those in need of such services" to young people ranging from third-graders to adults. Young people 16-21 are offered courses including computer operations, word processing and other skills necessary for success in today's job market.[30]

Reinventing Community Centers

Some pioneers in the field predict that many of these separate uses of new technology may eventually merge into comprehensive community learning and service centers where the functions of library, play area, job training facility and social services office would be combined. With weekend and evening hours to accommodate parents' and children's schedules, such centers could provide safe environments in which to learn, play, explore and find companionship.

CONCLUSION

New and exciting experiments with new information technologies are being tried out in communities across the country. So long as they are carefully designed and rigorously evaluated, these experiments hold the potential to help solve persistent problems facing children and families in fresh and perhaps more effective ways. Special care will need to be given to privacy protections, the need for professional training, and other new issues these advances present. Because of their promise, these experiments should be encouraged and supported by government, business and private philanthropy. The guiding focus should be on outcomes for children and families: improving the conditions of children and the quality of life for families, and providing them with needed services more effectively and efficiently.

advertising; First TV dinners • 1957: Sputnik—first man-made satellite; $3 billion spent on radio, TV and phonographs; $600 million spent on radio and TV repair • 1958: First computer

VII

WHERE DO WE GO FROM HERE? AN ACTION PLAN

The information superhighway can potentially benefit every American. However, there are still many unresolved questions. What basic service should be guaranteed as a right to every American? What system or combination of systems should be used for delivery? Who will pay for it? This report does not attempt to settle all of these crucial disputes which are being debated elsewhere. Instead, it focuses on the question not yet a part of the debate: How can children's needs be best served?

The Time to Act Is Now

Pivotal decisions about new information technologies are being made in the halls of Congress, in corporate offices and in school board, city council and public utility commission meetings across America. These decisions will determine how the new information technologies are deployed in homes, schools and communities. If children's interests are not represented effectively now, it will be much more difficult later on to secure the important opportunities these new technologies offer for children, and to guard children from harm.

Every American Has a Role to Play

Unlike certain other areas of social policy affecting children, much of the development and distribution of interactive multimedia technology and telecommunications systems will take place in the commercial marketplace. Since the marketplace by itself will not make children's interests a priority when developing the superhighway, public policy action will be required. Four principal groups have roles to play: policymakers at all levels of government; the telecommunications and technology industries; the public interest/nonprofit sector; and parents and young people in their roles as citizens and consumers.

Below, we have outlined a set of National Goals for Children and the New Technologies, followed by an Action Plan to accomplish these goals. Both the National Goals and the Action Plan were developed in consultation with a variety of experts from the public and private sectors.

NATIONAL GOALS FOR CHILDREN AND NEW TECHNOLOGIES

The goals set forth below grow directly out of the findings of this report and provide the basis for the Action Plan which follows. In addition, these goals represent measurable targets that can be tracked and reported to the American public over time by the news media and children's advocates.

Goal 1: Universal Reach

Every American child will have access to the information he or she needs for equal opportunity in economic and civic life. Necessary information resources should be easily accessible to every child in classrooms, libraries, neighborhood centers and homes.

Goal 2: Special Attention to Low Income and Other At Risk Children

Low income, disabled and rural children will be assured access to necessary equipment and educational materials, as well as the opportunity to learn the skills necessary to utilize them. Vigorous leadership in the public and private sectors is needed to compensate for market forces that will otherwise leave disadvantaged children behind.

Goal 3: Education to Prepare for Jobs and Life in the 21st Century

A quality education, including information skills necessary to function in the workplace and community of the 21st century, will be available to every child. The skills expected of all American children entering the job market should be redefined to include not only traditional literacy, mathematical ability and critical thinking, but also "information literacy."

Goal 4: High-Quality Content for Children

High-quality noncommercial programming will be available to all children. Following the important tradition of the Children's Television Workshop and public television, such programming materials should be publicly funded and/or subsidized.

game—ping pong—invented by William Higinbotham • 1960: 45 million homes have TV (90%); 25 million radios sold; Kennedy-Nixon debates watched by 90% of households. First laser

Goal 5: Protections Against New Forms of Abuse Through Technologies

There will be safeguards to protect children from deceptive advertising, excessive violence and other inappropriate material on computer bulletin boards and on-line networks, as well as in entertainment programming, including video games and other software. Such safeguards will require a combination of special regulatory protections, technological solutions and public education.

Goal 6: Industry Responsibility for Children's Needs

The telecommunications and technology industries will recognize their corporate responsibility to children and will actively seek to address children's needs. Industry leaders should encourage the creation, development and dissemination of quality products and services for children.

Goal 7: Parent and Citizen Action

Parents, guardians and other concerned citizens will need to serve as advocates for children, pressing for pro-child public policies as well as socially responsible behavior from telecommunications and technology companies. In addition, parents and guardians must play an active role in their children's media activities, including TV viewing and computer game playing.

Goal 8: Youth Involvement

Young people themselves will play a significant role in shaping the information superhighway and in supplying information on it. With the keen interest in, and adept skills many young people bring to these technologies, they can become leaders and advocates in promoting the children's agenda.

GETTING FROM HERE TO THERE: A SEVEN-STEP ACTION PLAN

The recommendations that follow represent the first comprehensive plan aimed at meeting the needs of all children in America as they relate to the new technologies. Some of these ideas are now under consideration by Congress; others have been proposed by the Clinton Administration, industry leaders, education groups or public interest organizations. This action plan includes seven steps to be taken immediately:

1. Congress and related federal agencies should develop strategies to provide affordable access for everyone to the needed information resources, and should provide incentives for the development of educational materials appropriate for children.

More specifically, they should:

- Establish a national policy, along with an implementation plan, to ensure that this new communications system will serve all Americans in an affordable manner. Access should be provided to all children by connecting classrooms, libraries, community centers and homes.
- Ensure that information resources and related technologies are within the financial reach of every family by:

  Encouraging preferential rates for community institutions in exchange for such institutions providing public access to interactive communications;

  Forging a partnership with private industry to ensure that classrooms, community centers, and public libraries are connected to the superhighway;

  Creating mechanisms such as an assistance pool funded by the telecommunications and technology companies.

- Add information and technology literacies to the National Education Goals ("Goals 2000"). These should become standard achievement areas for students, with appropriate assessment tools developed. Teachers should be provided with needed training and technical assistance on an ongoing basis.
- Fund the development of child-appropriate educational materials. Following the precedents

developed in California. First felt tip pen: First weather satellite • 1963: Majority of public cites TV as primary news source; About 50% of poll respondents worry about TV's effect on

of the Public Broadcasting Service and the Children's Television Workshop, incentives and subsidies should be provided to "public producers" of high-quality content.

- Create "safe havens" for children in this increasingly complex communications era — places where parents can be certain that the informational content is child-appropriate.

- Through tax incentives and funding, encourage research and development to find effective new mechanisms that would enable parents to guide their children's use of information and programming.

2. Industry leaders should create a Corporate Leadership Council for Children and New Technologies to encourage private sector initiative and action.

Industry leaders can play an important role in guiding the developments in new media to benefit children. The Corporate Leadership Council could perform four functions:

- Identify specific ways in which various parts of the industry can help children, such as donating equipment and software to schools and libraries; or funding or lending technical assistance to schools and nonprofit organizations that serve children.

- Lead by example and urge colleagues to do their part by making children's interests a part of industry policies, and by addressing these issues in conferences, speeches and trade publications.

- Work with advocates and policymakers, lending support to legislation and regulations that further the children's agenda.

- Aid parents and children through consumer information about technology and software programs.

Following the example of the Committee on Economic Development and the Business Roundtable's leadership group on education, a strong cadre of industry people could become a very positive and influential leadership force for children. The group ought to include a range of relevant industry players from the software, cable, computer, telephone, entertainment and broadcast fields. This entity can operate as a new arm of an existing national business group (if the group already includes the appropriate industry leaders) or an altogether new entity.

3. Leaders in the public, private and philanthropic sectors should convene a National Summit on Children and New Technologies to put these important issues on the table and begin to build momentum behind them.

Just as Vice President Gore convened leaders in the telecommunications industry at the January 1994 "superhighway summit," a prominent group of industry, government and children's leaders should be convened to exchange views on children and the new technologies, and to begin to build a national strategy.

4. In conjunction with the National Summit, these leaders should establish a Blue Ribbon Work Group for Children and New Technologies, charged with crafting a national strategy to ensure that all children in the United States benefit from the information revolution.

More specifically, the group should identify areas where the marketplace is unlikely to produce what children need. It should then decide what steps need to be taken in the areas of: universal reach, high-quality content, "safe havens" for children, information literacy skills, and appropriate protections. Recommendations should include a legislative package for Congressional action, financing strategies and annually-measured targets related to the goals for children. Recognizing that crucial policy decisions shaping the superhighway are now being made and will continue to be made over the next decade, the recommendations should be completed no later than January 1, 1996.

The Blue Ribbon Work Group, bringing together eminent Americans from private industry, government and the nonprofit sector, should be

children; John F. Kennedy assassination and funeral—96% of all households watched an average of 31 hours; Kodak introduces the Instamatic • 1968: Cassette recorders outsell reel-to-

modeled after other successful policy-oriented efforts such as the Carnegie Commission on Education Television, whose 1967 report set out the blueprint for public television in this country.

5. The nonprofit community should establish an on-line "Consumer Information Service" devoted to the technology-related needs and questions of children and parents.

With the large number of new interactive media products coming on the market, and with consumers unable to "try them out" before buying them, there is a need for product information that enables consumers to make wise choices for and with their children. An ongoing information service is needed along the lines of *Consumer Reports*, covering consumer tips and product reviews. This service should be operated by a public interest organization which draws on the expertise of the best educators, psychologists and child development specialists in the country.

6. Parents and young people should exercise their influence as citizens and consumers to shape the uses of interactive media.

Parents and young people can significantly influence how the superhighway develops since they represent an extremely large portion of the consumer market. Every parent or young person can help by doing several simple things:

- Learn about the new technologies and try them out — go to open houses and community meetings to become familiar with them. If such meetings do not exist, encourage schools and community leaders to arrange them.
- Engage in public advocacy around the children's agenda. For example, join forces with the groups advocating for these issues, write to elected officials and to local newspapers.
- Let software developers know your reactions to their products. If they hear from enough consumers, they will pay attention.
- Learn critical media skills in order to better understand and evaluate interactive media materials. Media literacy classes and publications are available in many communities.

7. Children's advocates should keep the issues related to children and technology at the top of the public agenda and link them to their ongoing work for children.

- Become educated about the new information technologies, children's interests, and the National Goals for Children and Action Plan outlined in this report.
- Make sure that someone who can represent the needs of children sits on the corporate boards, city councils, and other bodies where relevant decisions are made.
- Make new technology issues a part of the ongiong children's agenda. Integrate them into efforts to establish safe after-school activities, strengthen schools, and support parents.
- Report on the progress, or the lack thereof, in meeting the National Goals for Children. Keep the spotlight on the positive and negative things going on related to the new information technologies and children.
- Form coalitions with powerful allies to achieve the national goals for children. Links can be forged with many organizations and projects involved in telecommunications policy, including the Telecommunications Policy Roundtable, the Software Publishers Association, America's Public Television Stations, the National Cable Television Association, the Coalition for Children's Television, the National Coordinating Committee on Technology in Education and Training, the United State Telephone Association, People For the American Way and their Media Access Project.

A CLOSING WORD

This moment represents a unique opportunity to create a national information superhighway strategy that meets the needs of America's children. The Children's Partnership looks forward to participating in the creation of that strategy, and will continue to educate the public in order to build a strong leadership group for children across the country.

reel recorders. Number of U.S.-based TV manufacturers: 18. TRW has files on 20 million Americans. Tet Offensive, assassinations of Martin Luther King and Robert Kennedy. *2001: A*

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APPENDIX I

FREQUENTLY-ASKED QUESTIONS ABOUT THE INFORMATION SUPERHIGHWAY

What is the information superhighway?

The information superhighway is our country's communications infrastructure, the national network of wire and cable over which information moves. We already have a basic nationwide network — the telephone wiring that connects most of the country, and the coaxial cable networks that are used for cable television in cities and rural areas around the country. Over the next decade, this existing network will be upgraded as companies lay high-capacity fiber-optic cable around the country. This fiber-optic cable will make it possible to send much more complex kinds of information, and for individuals to send information out of their homes as well as take information in.

When will the superhighway be built?

The Clinton Administration has called for every classroom, library, hospital and clinic to be connected by the year 2000. However, many experts are skeptical that this goal will be completely realized on time. Experts predict that connecting the entire country could take anywhere from 10 to 30 years.[1]

How much of the superhighway is hype?

A fair amount. Marketers benefit from it, and no one really knows what the communications system will ultimately look like. Therefore, we are likely to continue to see hyperbolic projections of the potential of new technologies. The technical problems are still substantial, and the rewards are still unknown. There is no guarantee that the public will want all of the interactive applications the telecommunications companies are planning to provide, and hence economic projections are somewhat unreliable.[2] However, there is reason to believe that, once interactive multimedia and telecommunications technologies are widely available, they will have a significant influence on the way Americans work, play and communicate.

Who is building the information superhighway?

The commercial developers, for the most part, on their own initiative because they see an opportunity for profit: They believe that the consumers will want to buy the new entertainment, information and communications services that the network will make possible. Most of the companies involved are telecommunications companies like Bell Atlantic, Pacific Telesis, and the other "Baby Bells"; cable operators like Tele-Communications, Inc.; and media companies like Time Warner. There will be some public service expenditures but, for the most part, they will be by-products or strategies to avoid government regulations.[3]

How much will it cost to wire the country?

Figures vary, with most estimates in the hundreds of billions.[4]

Who will pay for it?

The telecommunications companies will invest in laying the foundations of the superhighway, in the hopes of substantial profits from consumers. Almost everything on the superhighway, including educational channels, will be supported by fees and/or advertising — just like magazines, newspapers, telephone service, radio, and all forms of television. The information superhighway will have toll booths at regular intervals, and billboards from end to end. Media advocates have called for an exception — a publicly subsidized area for public interest purposes.[5]

What influence will the American public have?

Vigorous public pressure will be needed to influence regulations and the all-important decisions made by the government and telecommunications industry. In addition, as in any market environment, the public's influence will come largely through what it buys and demands.

APPENDIX II

TERMS USED IN THIS REPORT

BULLETIN BOARD SYSTEM (BBS): A central computer that you can connect to over a phone line using your own computer and modem. Most BBSs offer files, programs and other information that you can download to your own computer, and some enable you to send E-mail and communicate with other users who are connected at the same time.

CD-ROM: A disk that stores large amounts of textual and audiovisual information used with personal computers that have CD-ROM "drives." The acronym stands for Compact Disk Read Only Memory. In other words, it only plays back information, so, unlike "floppy disks," CD-ROMs cannot record — at least not yet.

COAXIAL AND FIBER-OPTIC CABLES: High-speed, high-volume information carrying lines. Coaxial cables (or "coax") are wires in which one conductor surrounds another. Used by the phone companies since 1940, they carry information for telephone, radio and television. Fiber-optic cables (or "fiber") transform information (video or text) to pulses of light which are transmitted on incredibly fine glass cables to computers which turn the pulses into images. Today's best fiber telephone lines can carry 10,000 times more information per second than a traditional copper wire — and scientists expect further improvements over the next decade.

CYBERSPACE: General term used to refer to the electronic "areas" and communities existing on the Internet and other computer networks.

E-MAIL (ELECTRONIC MAIL): A way of addressing and sending messages electronically from one computer to another. Users can send memos, letters and other text-based messages, as well as multimedia documents.

HARDWARE: The nuts, bolts and wires. The actual computer and related machines.

INFORMATION LITERACY: The ability to access, manipulate and produce information using current technologies. Information literacy is based on strong reading, writing and calculating skills and is aimed toward developing critical thinking, problem-solving and life-long learning skills. (See related term: Technology Literacy.)

INFORMATION SUPERHIGHWAY: A term popularized by V ice President Al Gore. The information superhighway is envisioned as a global high-speed network of computers that will serve thousands of users simultaneously, transmitting E-mail, multimedia files, voice and video. This system is expected to link homes, offices, schools, libraries and medical centers, so that textual and audiovisual information can be instantly accessed and transmitted from one computer screen to another. (See related term: NII.)

INTERACTIVE MEDIA: A broad term for two-way electronic communication. Interactive TV includes home shopping, video-on-demand and a variety of games and entertainment in many different formats, which provide the user with choices for learning or play. CD-ROM and other computer software can also be interactive — between the user and the program. To be distinguished from essentially "one-way" media such as traditional radio, television and movies.

INTERNET: The global "networks of networks" that connects corporations, small businesses, universities and individuals, giving them access to databases throughout the world. Every Internet user can send E-mail to every other Internet user. The Internet alone is not the information superhighway, but an existing system that would be one element of the superhighway.

MEDIA POLICY: Government rules, regulations or guidelines for radio and television. (See related term: Telecommunications Policy.)

MODEM: Short for "modulate-demodulate," a device which allows computers to communicate over telephone lines or other delivery systems.

MULTIMEDIA: A combination of two or more types of information such as text, audio, video, graphics and images.

NEW MEDIA: A term which encompasses interactive TV, CD-ROMs, video games and on-line systems.

NEW TECHNOLOGIES: The new ways of storing, accessing and transmitting information, combining applications of the telephone, television and computer.

 have radios • 1975: More TVs than bathtubs in U.S.; 50 million pocket calculators produced worldwide; Business and government use 800 billion pieces of paper per year • 1976: Wang

NII: National Information Infrastructure. The United States Government's official term for the "Information Superhighway." In some ways, "infrastructure" is a more accurate description of a wired, interconnected world than the more linear "superhighway."

ON-LINE OR ONLINE: Connected, linked. Working on a single computer is not being on-line. Working on a computer linked to other computer information services or "bulletin boards" is being on-line. "On-line services" such as America Online or CompuServe are private electronic areas where subscribers to the system can exchange typed messages, access information, pictures, etc.

SOFTWARE: A computer program; loosely defined, a package of information to be used on your hardware.

TECHNOLOGY LITERACY: The ability to use, understand and manipulate new tools like computers and other telecommunications devices. (See related term: Information Literacy.)

TELECOMMUNICATIONS INDUSTRY: Phone companies and their communications satellites, cellular services, wireless transmitters, etc. Mergers with the entertainment industry (such as broadcast and cable TV) will expand the definition to include all providers of electronically-transmitted information.

TELECOMMUNICATIONS POLICY: Government rules, regulations or guidelines for the electronic communications industry, i.e. telephone, broadcast and cable television companies. (See related term: Media Policy.)

UNIVERSAL SERVICE: The availability and accessibility of a service (in this case, technology for interactive communications) to people in every home and community. Telephone service is nearly (but not fully) universal in the United States.

VIRTUAL REALITY: Computer-generated visuals simulating a real or imaginary environment. Also known as "VR."

WIRELESS SYSTEMS: Transmission of information through the airwaves without the use of wires, as in the case of devices including cellular phones, and paging and messaging services.

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BEST COPY AVAILABLE

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Ms. Lazarus is a widely respected children's policy expert, having spent nearly twenty years on the front lines of advocacy as a lobbyist and policy analyst, in Washington, DC and four states. She served as senior staff at the Children's Defense Fund throughout the 1970's and later as Children Now's founding Vice President for Policy. Ms. Lazarus is the author of more than 20 major reports and articles on a broad range of children's issues, including health, child support, child care, family income and welfare, and abuse and neglect. She has helped secure major reforms for America's children, such as extending health coverage to millions of uninsured children and pregnant women. Ms. Lazarus is often turned to as a resource by the media, legislators, community leaders and children's advocates.

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The Children's Partnership

Ms. Lipper is nationally recognized as a leading resource on media advocacy for children, with more than 15 years experience in social issue communications. Between 1988 and 1993 she served as founding Vice President for Communications at Children Now, helping to forge a media and advocacy program that has become a national model, and which resulted in concrete service, community and legislative gains for children. Ms. Lipper has written and designed numerous reports, and has produced award-winning public service campaigns. Ms. Lipper was the executive director of The Nation Institute, a New York-based public education organization focused on First Amendment, foreign and domestic public policy, and news media issues.

Video game industry collapses—Atari loses $530 million, Mattel loses $200 million • 1985: 20% of homes have a VCR; Number of PCs in offices: 10 million • 1989: 99% of households

APPENDIX IV

INFORMATION RESOURCES

ORGANIZATIONS

Following is a list of organizations that can serve as resources on certain issues related to the information superhighway. It is meant to provide a useful starting point rather than to serve as an exhaustive list.

American Federation of Teachers
555 New Jersey Avenue NW
Washington, DC 20001
202-393-7477

American Psychological Association
750 First Street NE
Washington, DC 20002
202-336-5700

Benton Foundation
Communications Program
1634 Eye Street NW, 12th Floor
Washington, DC 20006
202-638-5770

The Center for Children and Technology
96 Morton Street, 7th Floor
New York, NY 10014
212-633-8230

Center for Governmental Studies
10951 West Pico Boulevard
Los Angeles, CA 90064
310-470-6590

Center for Media Education
1511 K Street NW, Suite 518
Washington, DC 20008
202-628-2620

Children Now
1212 Broadway, Suite 530
Oakland, CA 94612
510-763-2444

Children's Television Workshop
One Lincoln Plaza
New York, NY 10023
212-595-3456

Committee on Applications and Technology
National Institute of Standards and Technology
Building 225, Room B164
Gaithersburg, MD 20899
301-975-4529

Computer Learning Foundation
P.O. Box 60007
Palo Alto, CA 94306-0007
415-327-3347

Electronic Frontier Foundation
1001 G Street NW, Suite 950 East
Washington, DC 20001
202-347-5400

HandsNet
20195 Stevens Creek Boulevard, Suite 120
Cupertino, CA 95014
408-257-4500

KIDSNET
6854 Eastern Avenue NW, Suite 208
Washington, DC 20012
202-291-1400

The George Lucas Educational Foundation
P.O. Box 3494
San Rafael, CA 94912
415-662-1600

Mediascope
12711 Ventura Boulevard, Suite 250
Studio City, CA 91604
818-508-2080

National Education Association
1201 16th Street NW
Washington, DC 20036
202-833-4000

National Information Infrastructure Office
15th Street and Constitution Avenue NW
Washington, DC 20230
202-482-1840

The National PTA
330 North Wabash Avenue
Chicago, IL 60611
312-670-6782

National School Boards Association
Institute for the Transfer of Technology to Education
1680 Duke Street
Alexandria, VA 22314
703-838-6722

NCC-TET (National Coordinating Committee on Technology in Education and Training)
P.O. Box 4437
Alexandria, VA 22303
703-351-5243

People for the American Way
2000 M Street NW, Suite 400
Washington, DC 20036
202-232-4300

have TVs. 600 million TV sets worldwide—1 for every 9 people. Revenues from "adult" videos: $1 billion. Nintendo controls 80% of revived, $3 billion video game market • 1990: 4 million

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WRITTEN MATERIALS

Following is a list of books, journals and reports about children and the new technologies. While this is only a sampling, these resources are a useful place to start.

Children and Media

Anderson, R. E., ed., *Computers in American Schools 1992: An Overview*, University of Minnesota, 1993.

Brown, L., *Les Brown's Encyclopedia of Television*, New York Zoetrope, 1982.

Carnegie Commission, *Public Television: A Program for Action*, Harper & Row, 1967.

Dorr, A., *Television and Children: A Special Medium for a Special Audience*, Sage Publications, 1986.

Honey, M., and Henriquez, A., *Telecommunications and K-12 Educators: Findings from a National Survey, Center for Technology in Education*, Bank Street College of Education, 1993.

Huston, et al., *Big World, Small Screen: The Role of Television in American Society*, University of Nebraska Press, 1992. (American Psychological Association)

Manley-Casimir, M. E., and Luke, C., eds., *Children and Television: A Challenge for Education*, Praeger Publishers, 1987.

Minow, N. N., *How Vast the Wasteland Now?*, Gannett Foundation Media Center, 1991.

Montgomery, K. C., *Target: Prime Time: Advocacy Groups and the Struggle Over Entertainment Television*, Oxford University Press, 1989.

Ratner, E. M., et al., *FTC Staff Report on Television Advertising to Children*, 1978.

Signorielli, N., *A Sourcebook on Children and Television*, Greenwood Press, 1991.

Software Publishers Association, *Report on The Effectiveness of Technology in Schools 1990-1994*.

Software Publishers Association, *SPA K-12 Education Market Report*, July 1994.

Van Evra, J., *Television and Child Development*, Lawrence Erlbaum Associates, 1990.

The Information Superhighway

Reports

Information Infrastructure Task Force, *The National Information Infrastructure: Agenda for Action*, September 15, 1993.

Information Infrastructure Task Force Committee on Applications and Technology, *Putting the Information Infrastructure to Work: Report of the Information Infrastructure Task Force Committee on Applications and Technology*, U.S. Government Printing Office, May, 1994.

Times Mirror Center for The People & The Press, *The Role of Technology in American Life*, May 1994.

Magazine Articles

"The Information Revolution," *Business Week Special 1994 Bonus Issue*.

"The Data Highway," *Byte*, March 1994.

"Eyes on the Future," *Newsweek*, May 31, 1993.

"Electronic Superhighway," *Time*, April 12, 1993.

Consumer Guides

Books, Brochures and Catalogs

American Academy of Pediatrics, *Television and the Family: Guidelines for Parents*.
To order, write:
American Academy of Pediatrics
Division of Publications
141 Northwest Point Boulevard
P.O. Box 927
Elk Grove Village, IL 60009-0927

Center for Media Literacy, *Media Literacy 1994 Catalog*.
To order, call: 800-226-9494

Coalition for Quality Children's Video, *Kids First! Directory: Quality Children's Videos—What They Are, Where to Find Them, Tips for Parents*, 1994.
To order, call: 505-989-8076

Falk, B., *The Internet Roadmap*, Sybex, 1994.
To order, call: 800-227-2346

Hoffman, P. E., *Internet Instant Reference*, Sybex, 1994.
To order, call: 800-227-2346

Schwartz, S. A., and Schwartz, J., *Parent's Guide to Video Games*, Prima Publishing, 1994.
To order, call: 916-786-0426

Magazines

FamilyPC, Walt Disney Company/Ziff-Davis.
To order, call: 800-413-9749. America Online: Screen name **FamilyPC**.

HomePC, CMP Media.
To order, call: 800-829-0119. Available on America Online and other electronic services. For more information, call 516-562-7405.

cellular phones. 75% of homes have a VCR. Time Warner has 33% of the revenue and 40% of the profits of all American magazines. More than 50% of contact between U.S. and Japan

APPENDIX V

ACKNOWLEDGMENTS

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is via fax. Cable companies spend $24 million on lobbying and advertising. Phone companies spend $20 million on lobbying • 1992: 25% of public reads books 'regularly' • 1994: 57

Kevin Ota, Los Angeles Educational Partnership; Susan Harbert and Ruth Hunter, Main Street Communications; John Stuppy, UCLA School of Management; Bill Tan, Tan and Sakiyama; Julie Carlstrom; Michael Halperin; Philip S. Becker, Jr.; Chuck Peters, Breakthrough!; Dan Forbush, PROFNET; Christina Tillotson, Community Learning and Information Network; Jim Tetreau, Strive Center; Cheri Sterman, Binney and Smith, Inc; Carol Starks; Michael Kobrinsky; Peter Shaw; Norman Praught; Tom David and National Direct Marketing Corporation; Richard Mintz; and Judy Weitz, consultant on children's issues.

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Organizations are listed for identification purpose only.

WHAT OTHERS ARE SAYING ABOUT AMERICA'S CHILDREN & THE INFORMATION SUPERHIGHWAY

The Children's Partnership has succeeded at taking a subject of great national significance — the information revolution — and explaining to the American public why it matters to children. This report is ahead of its time and provides an early alert to all of us about an emerging children's issue.

Hon. Shirley M. Hufstedler, Hufstedler & Kaus, Former Secretary of Education

Interactive multimedia and telecommunications technologies are transforming the way our children learn. The potential of the superhighway is enormous, but will never be fully realized unless EVERY child has the opportunity to travel and explore it. This report raises challenging questions and proposes important initiatives for private industry, public policy makers, parents, educators, and others.

George Lucas, Chairman, The George Lucas Educational Foundation

America's Children & the Information Superhighway is an extremely helpful briefing on a subject that will affect the lives of millions of children. While providing a chilling forecast of even greater disadvantages for the nation's poor children, I hope its timing and recommendations will help all of us to avoid leaving these children behind.

Marian Wright Edelman, President, Children's Defense Fund

This excellent summary of the impact of the new media on children provides communities and advocates a clear roadmap to ensure that all children have access to and benefit from these technologies.

Angela Glover Blackwell, President, Urban Strategies Council

"We can learn one thing clearly from the history of television in this country—the commercial market alone will not do what's right for kids. This report makes crystal clear that an interested public and advocates for children must represent kids' interests early on, at the beginning stage of mapping the information superhighway.

Peggy Charren, Founder, Action for Children's Television

America's Children & the Information Superhighway provides an insightful and handy format, a cogent and concise presentation of what the new media mean for kids. Kudos to The Children's Partnership.

Milli M. Martinez, Executive Producer Special Projects, KABC-TV Los Angeles

Tomorrow's communications network can help serve the public interest — but only if there is vigorous public participation in the debate over who has access to it and what it is designed to do. This report focuses on an often-forgotten segment of America — children — and it's an excellent guide to understanding and protecting their interests.

Andrew Blau, Director, Communications Policy Project, Benton Foundation

For those of us who specialize in technological development, this report is a wonderful resource. It gives publishers needed direction not only in what to put in children's software, but also in how to get that software to all children who can benefit from it. This is "must reading" for leaders in the technology industry who care about children.

Heidi Roizen, Past President, Software Publishers Association, and CEO, T Maker

A provocative and timely report. Children and their stake in this developing new multimedia display an important topic and this report will, at a critical time, help call attention to it.

David V.B. Britt, President & CEO, Children's Television Workshop

Parents, teachers, and young people need to be part of the discussion about the information superhighway. With this report The Children's Partnership has provided a wonderful introduction to this important new children's issue, giving parents and teachers the opportunity to stay involved with their children as they explore the new technology.

Kathryn Whitfill, President, The National PTA

As the information revolution speeds along, this report helps focus attention on the needs of children and provides a reminder that every sector — public, private, civic and parents — can make important contributions to children. I found it to be a very helpful report.

Decker Anstrom, President & CEO, National Cable Television Association

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